Outcomes associated with pharmacist-driven MRSA nasal screenings in patients with suspected pneumonia

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Background

- Methicillin-resistant *Staphylococcus aureus* (MRSA) is a drug resistant pathogen commonly covered empirically in patients with hospital acquired pneumonia (HAP), ventilator acquired pneumonia (VAP) and community acquired pneumonia (CAP) if multi-drug resistant organism risk factors are present per recommendations from the Infectious Diseases Society of America (IDSA).[1-2]
- Clinicians are often reluctant to de-escalate therapy if respiratory cultures have not finalized, which may lead to extended, often unnecessary exposure to antibiotics.
- The decision to de-escalate therapy can be guided by a negative MRSA colonization screening.[1-2]
- The negative predictive value (NPV) of MRSA screenings was reported as 96.5% in the largest meta-analysis to date.[3]

Purpose

- Compare days of therapy (DOT) of MRSA-targeted antibiotics before and after the implementation of a protocol allowing pharmacists to order MRSA nasal screenings in patients with pneumonia.

Study Endpoints

Primary endpoint

- Median days of therapy (DOT)

Secondary endpoints

- Length of stay (LOS)
- Pharmacists' adherence to protocol
- Number of vancomycin and linezolid doses administered
- Number of vancomycin trough levels obtained

Methods

- Chart review of patients receiving vancomycin or linezolid for pneumonia during admission at OMC pre- and post-guideline implementation, July 2020 to October 2020 and December 2020 to March 2021, respectively.
- Patients were excluded if they had a positive MRSA screening, MRSA respiratory isolate, presence of another infection requiring MRSA coverage, were less than 18 years old, pregnant, or incarcerated.
- MRSA screenings were performed using swabs obtained from a patient's nares and plated on MRSA growth media.
- Nominal data were analyzed using the x^2 test.
- Continuous data were analyzed using the t-test or Mann-Whitney *U* test.

Figure 1 – MRSA Screening Protocol

A pharmacist may order MRSA nasal screening if the following criteria are met:

1. Diagnosis of pneumonia or "sepsis, source unknown"
2. Vancomycin or linezolid ordered
3. Exclusions
   a. Confirmed MRSA in respiratory cultures from present admission
   b. MRSA nares previously ordered during admission
   c. Bronchoalveolar lavage pending

Results

A total of 219 patients were included, 136 and 83 in the pre- and post-intervention groups, respectively. 277 charts were reviewed, and 58 patients were excluded due to positive MRSA screenings, isolation of MRSA in respiratory cultures, or concurrent infections requiring MRSA-targeted therapy.

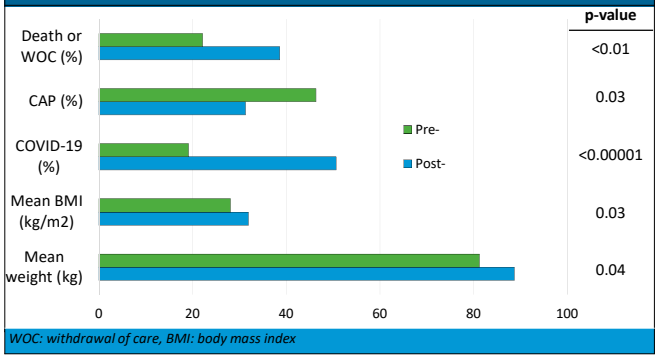
Population Characteristics (n=219)

Table 1 – Selected Baseline Patient Characteristics

	Pre-protocol mean or %	Post-protocol mean or %	p-value
Average age, years	69.7	71.5	0.35
Sex, male	59.6	65.1	0.42
Serum creatinine, mg/dL	1.7	1.8	0.52
Tmax, °C	37.8	37.9	0.46
Procalcitonin, ng/ml	2.1	1.4	0.37
Lactate, mmol/L	2.5	2.6	0.94
ICU admission	37.5	44.6	0.30
CAP	46.3	31.1	0.03
HCAP	42.6	48.2	0.42
HAP	8.8	16.9	0.07
VAP	2.2	3.6	0.54
CURB-65 score	2.0	2.4	0.03

Tmax: maximum temperature, ICU: Intensive care unit, HCAP: healthcare-associated pneumonia, CURB-65: confusion, uremia, respiratory rate, blood pressure, age>65

Figure 2 – Selected Statistically Significant Between Group Differences



WOC: withdrawal of care, BMI: body mass index

Figure 3 – MRSA Screening Rates (p<0.00001)

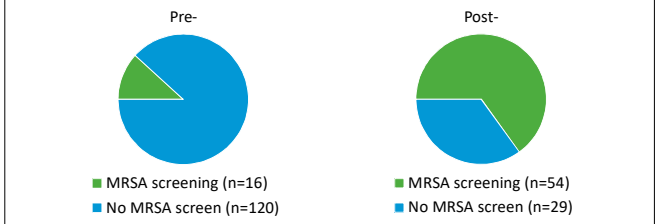


Figure 4 – Primary and Secondary Endpoints

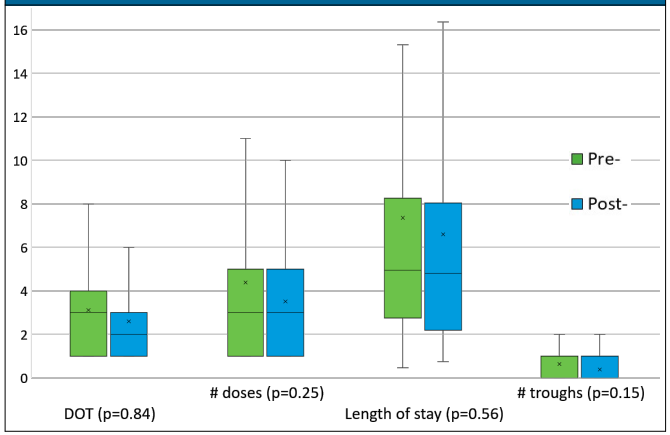


Table 2 – Exploratory Outcomes

	Pre-protocol (COVID excluded)	Post-protocol (COVID excluded)	p-value
DOT- median, [IQR]	**3, [1.8-4]**	**2, [1-3]**	**0.32**
	Pre-protocol	**Post-protocol (nares ordered)**	**p-value**
DOT- median, [IQR]	**3, [1-4]**	**2, [1-3.3]**	**0.34**

Conclusions

- The implementation of a pharmacist-driven MRSA screening protocol increased screening rates but did not significantly decrease average duration of MRSA targeted therapy in patients with pneumonia.
- Subgroup analyses that attempted to control for between group differences yielded similar results.
- Polymerase chain reaction (PCR) assays, as opposed to traditional plate cultures utilized in this study, will be needed to further evaluate the effectiveness of this protocol.

Limitations

- Due to the presence of significant confounders, namely differences in COVID infection rates and death/WOC rates, interpretation of these results are limited.
- Pre-and post-intervention groups were not matched for calendar months due to the COVID-19 pandemic to ensure COVID was present for both groups; furthermore, the unpredictability of the pandemic made it impossible to foresee future infection rates.
- Effectiveness of the protocol is limited by the unavailability of PCR based screening methods.

References

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3. Parente DM, Cunha CB, Mylonakis E, et al. *Clin Infect Dis*. 2018; 67(1): 1-7. doi: 10.1093/cid/ciy024.

Disclosure: Nothing to Disclose **Contact:** Justice Oehlert, PharmD at justice.oehlert@olathehealth.org